To: Providers of transport services, bus operators, suppliers of charging equipment, representatives of bus suppliers, relevant municipal units

From: Ruter

Invitation to dialogue conference on system test of battery electric buses in Oslo

Time: 13th February 2017, 09:30-15:00

Location: Ruter Customer center, Jernbanetorget 1, 0154 Oslo (entrance below tower)

Introduction

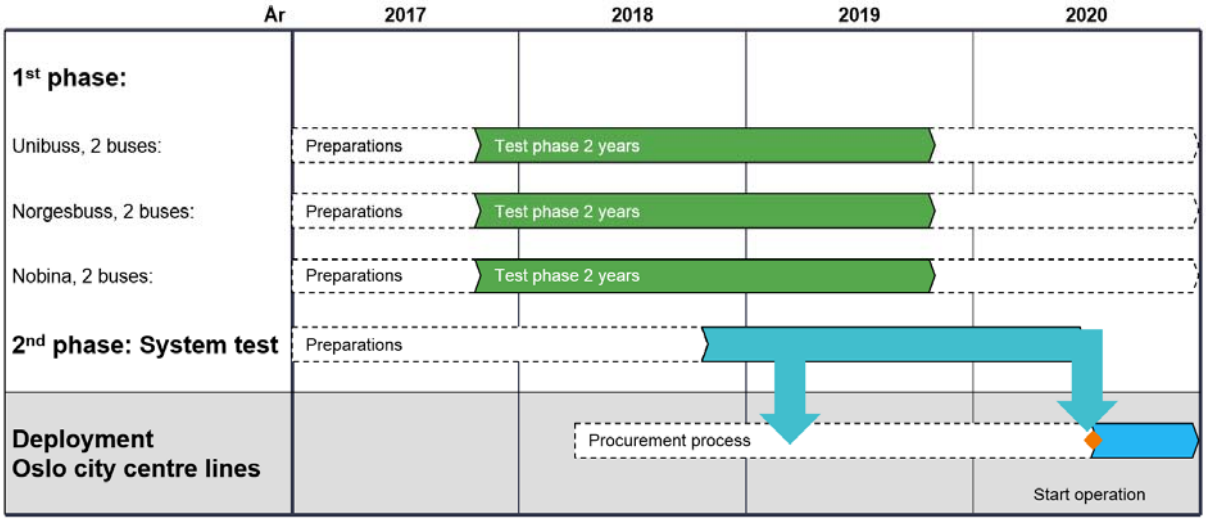
All public transport in Oslo and Akershus will be running on only renewable energy in 2020.

Ruter have decided on a target for a transition to renewable energy for the bus fleet, towards 2025. Electric propulsion is expected to be dominant in the future, and Ruter are now laying the foundations for the electrification of the bus fleet. Based on the current available solutions in the market, fast charging (opportunity charge) on end stations is expected to be the most suitable operating concept for bus operations in Oslo. Further information of the knowledge base for Ruter's considerations available at: https://ruter.no/en/about-ruter/reports-projects-plans/fossilfree2020/

Adopted targets involve a comprehensive rollout of electric buses in regular operation in central Oslo from 2020. The change to the electric operation with opportunity charging on end stops, represents a significant system change, with many new parties involved, compared to traditional bus operations.

As part of the preparations for this, testing of electric buses has been initiated. Initially, three parallel tests of a total of six electric buses is due to start up late autumn 2017. These tests will provide experience which can be used in the preparations and bus service procurement leading up to the start of full scale operations in 2020.

In addition, Ruter expects that it is necessary to conduct a system test, with a greater number of buses and charging stations, similar to the equipment which is to be used in deployment, ie articulated buses with fast charging at end stops. The purpose of such a test is to prepare the market to deliver electric bus services in real, full scale operation, with at least as good quality and operational stability for customers, as today's bus services. A rough schedule of activities are outlined below:



Purpose of the conference

Ruter wants to invite operators, manufacturers of buses and charging equipment, power suppliers and other relevant stakeholders to dialogue on what are the most important measures to lay the foundations for a good transition to electric bus operation in Oslo in 2020.

Questions which Ruter wants to discuss at the dialogue conference include:

- What are the key learning points in a system test? What are the major uncertainties and risks related to the phasing-in of approximately 100 battery electric articulated buses in the city center in 2020?

- What is needed to ensure that the startup and operation of around 100 electrically articulated buses in 2020 will deliver an equally good service to customers, as what we have today?
    - or are these buses / charging systems now so well proven / tested that Ruter can already ask for electric buses in ordinary tenders?

- Which business model should be applied in the test - ie who should own / operate / maintain the various elements of electric bus ecosystem? This will also help to ensure:
    - a test that provides the most relevant learning for many of the involved parties
    - sufficient flexibility to take into account the rapid technological development (e.g duration and structure of contracts)

- Who should procure buses and infrastructure for a system test?
    - Should Ruter conduct separate procurement of electric buses, infrastructure and bus services, or
    - should any / all three procurements be merged together into one tender?

- How big size/scope should the test operation have, to provide value as a system test?
    - how many electric buses, the number of charging points, the number of driven km or hours per year, duration of contract, etc, is needed for generating 'good enough' experience to follow up with full scale deployment?

- How is the market's expected delivery capability and lead times in 2018-20?
    - Total time from award of contract to the startup of commercial passenger service with electric opportunity charge buses

Participants are asked to prepare short presentations (max 10 min) as feedback to the questions, and any other relevant issues.

Ruter will publish (in Norwegian) possible high-level points of parts of a possible tender, about two weeks before the dialogue conference at the following website: https://ruter.no/kollektivanbud/moter/

- Appendix 1 - Bus line/service description
- Appendix 2 - Material description
- Appendix 4 - Infrastructure description (including charging infrastructure and bus depot)

These drafts will be discussed at the dialogue conference and Ruter is asking suppliers to provide feedback on the drafts at the conference.

Tentative agenda and registration

Time	Agenda	
0930	Registration and welcome	Ruter
1000	Presentation of the background for the conference, project Fossilfree 2020 and the status of electric bus activities. Presentation of a possible model for tendering the system test, based on draft tender attachments.	Ruter
1200	Lunch	All
1300	Presentations from participants - feedback on stated questions	Participants
1500	Summary and conclusion	Ruter

Registrations: please notify us at bussanbud@ruter.no within 10th Feb 2017.

The conference will be held in Norwegian. Presentations and comments may be delivered in English.

After the dialogue conference Ruter will send out additional questions or new issues that need answers. Those who answer questions, will be invited to 1: 1 meetings with Ruter, at a maximum of one hour each. The meetings will follow a fixed schedule, and will take place in Ruter premises, alternatively as video or telephone conferences. Meetings can be held in Norwegian or English, depending on desire.

Information exchanged in the meetings can potentially be used in aggregated / anonymous form, in tenders for upcoming procurements.